

CLAIMS

We claim:

1. A storage device comprising:

a cabinet capable of holding a plurality of modules capable of containing a plurality of
5 storage devices, said cabinet having a docking port being configured to electrically connect to
said modules;

each module of said plurality of modules including:

a board having a plurality of ports, each port of said plurality of ports being capable of
electrically connecting to a storage device, and said plurality of ports being arranged in rows so
10 that a plurality of storage devices are arranged in rows with a lateral surface facing parallel to a
lateral edge of said board when said plurality of storage devices are connected to said board.

2. The storage device of claim 1, wherein each module further includes a side
housing member having raised portions and lowered portions, said raised portions providing a
15 channel to allow airflow through said module.

3. The storage device of claim 2, wherein each module further includes a top
housing member having lateral raised portions and lateral lowered portions, said lateral raised
portions providing a channel to allow airflow through said module.

4. The storage device of claim 3, wherein said top housing member includes a
plurality of individually removable segments.

5 5. The storage device of claim 2, wherein each module further includes a bottom housing portion having raised bottom portions and lowered bottom portions, said raised bottom portions providing a channel to allow placement of a controller to control storage devices attached to said board and to allow placement of power and control interconnections to said plurality of ports.

6. The storage device of claim 5, wherein lowered bottom portions provide mechanical support to said board.

10 7. The storage device of claim 1, wherein said board further includes an electrical connector capable of electrically connecting said module to said docking port in said cabinet.

8. The storage device of claim 7, wherein said board further includes a latching mechanism capable of mechanically connecting said module to said docking port in said cabinet.

15 9. The storage device of claim 8, wherein each module of said plurality of modules is configured to be electrically disconnected and mechanically removed from a docking port within said cabinet by a single operation, and to allow a single disk drive of said plurality of disk drives to be removed without disturbing a connection of other disk drives connected to the board of the module.

20 10. A storage apparatus comprising:

a board having a plurality of ports, each port of said plurality of ports being capable of electrically connecting to a storage device, and said plurality of ports being arranged in rows so that a plurality of storage devices are arranged in rows with a lateral surface facing parallel to a lateral edge of said board and control connectors on said storage devices face and connect to a port when said plurality of devices are connected to said board; and

a housing holding said board and configured to hold a plurality of devices in rows with a lateral surface of said storage devices facing parallel to a lateral edge of said board when said plurality of devices are connected to said board.

11. The storage apparatus of claim 10, wherein said housing further includes a side housing member having raised portions and lowered portions, said raised portions providing a channel to allow airflow through said module.

12. The storage apparatus of claim 11, wherein said housing further includes a top housing member having lateral raised portions and lateral lowered portions, said lateral raised portions providing a channel to allow airflow through said module.

13. The storage apparatus of claim 12, wherein said top housing member includes a plurality of individually removable segments.

14. The storage apparatus of claim 11, wherein said housing further includes a bottom housing portion having raised bottom portions and lowered bottom portions, said raised bottom portions providing a channel to allow placement of a controller to control storage devices

attached to said board and to allow placement of power and control interconnections to said plurality of ports.

15. The storage apparatus of claim 14, wherein lowered bottom portions provide
5 mechanical support to said board.

16. The storage apparatus of claim 10, wherein said board further includes an electrical connector capable of electrically connecting the storage apparatus to an external control device.

10 17. The storage apparatus of claim 16, wherein said board further includes a latching mechanism capable of mechanically connecting the storage apparatus to an external control device.

15 18. The storage apparatus of claim 17, wherein the storage apparatus is configured to be electrically disconnected and mechanically removed from a docking port within said cabinet by a single operation, and to allow a single disk drive of said plurality of disk drives to be removed without disturbing a connection of other disk drives connected to the board.

20 19. The storage apparatus of claim 10, wherein said housing is made of thermally conductive material.

20. A method of packaging storage devices having a control connector on an end surface of each storage device, the method comprising the steps of:

A) orienting a first storage device so that an end having a first storage device control connector faces a board and a lateral surface of the first storage device is parallel to a first lateral edge of said board;

B) pushing the first storage device on to said board so that the first storage device control connector becomes electrically connected to a first port on said board;

C) orienting a second storage device so that an end having a second storage device control connector faces a board and a lateral surface of the second storage device is parallel to a second lateral edge of said board, and an opposite lateral surface of the second storage device is parallel to another lateral surface of said first storage device, said second lateral edge of said board being opposite to the first lateral edge of said board; and

D) pushing the second storage device on to said board so that the second storage device control connector becomes electrically connected to a second port on said board.

21. The method of packaging storage devices according to claim 20, wherein the board has a plurality of ports arranged in rows, each port of said plurality of ports being capable of electrically connecting to a control connector, the method further comprising the step of:

repeating steps A through D until all of the plurality of ports are attached to a storage device.

22. The method of packaging storage devices according to claim 20, further comprising the step of:

covering said board, said first storage device and said second storage device with a housing, said housing having side housing member having raised portions and lowered portions, said raised portions providing a channel to allow airflow through said module.

5 23. The method of packaging storage devices according to claim 22, wherein said housing further includes a bottom housing portion having raised bottom portions and lowered bottom portions, said raised bottom portions providing a channel to allow placement of a controller to control storage devices attached to said board and to allow placement of power and control interconnections to said plurality of ports.

10 24. The method of packaging storage devices according to claim 22, wherein said board further includes an electrical connector, the method further comprising the step of inserting said housing in a cabinet suited for holding a plurality of housings having a plurality of storage devices and electrically connecting the electrical connector to a docking port in the cabinet.

15 25. The method of packaging storage devices according to claim 24, wherein said board further includes a latching mechanism capable of mechanically connecting the storage apparatus to an external control device, and the method further comprises the step of latching the latching mechanism to the docking port in the cabinet.

20 26. The method of packaging storage devices according to claim 25, wherein the steps of latching the latching mechanism and electrically connecting the electrical connector occur by the same action of an operator.

27. The method of packaging storage devices according to claim 25, further comprising the steps of un-latching the latching mechanism and disconnecting the electrical connector occur by the same action of an operator.

5 28. The method of packaging storage devices according to claim 20, wherein the action of pushing the first storage device in step B electrically connects and mechanically connects the first storage device to the board in a single operation.

10 29. The method of packaging storage devices according to claim 28, wherein the action of pushing the second storage device in step D electrically connects and mechanically connects the second storage device to the board in a single operation.

15